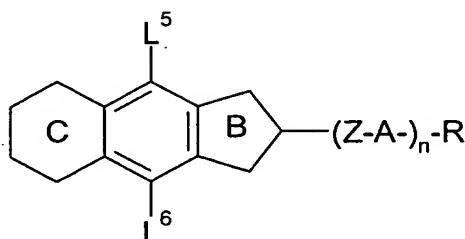


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Patent Claims

1. Cyclopenta[*b*]naphthalene derivatives of the general formula (I)

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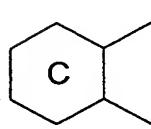


(I)

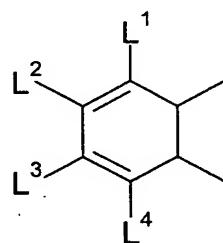
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in which:

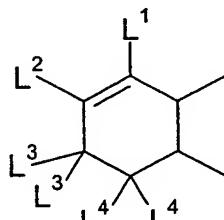
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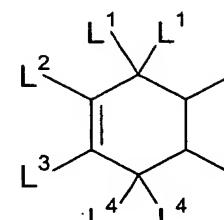
is



a

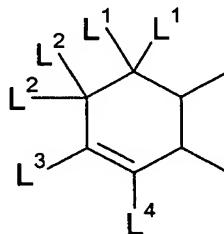


b

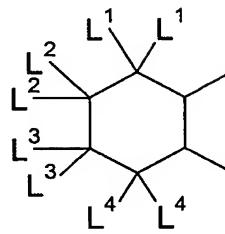


c

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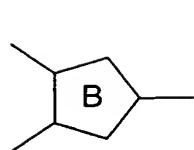
or



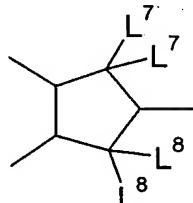
e

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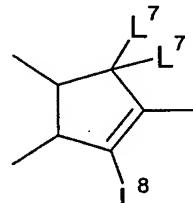
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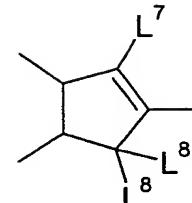
is



a



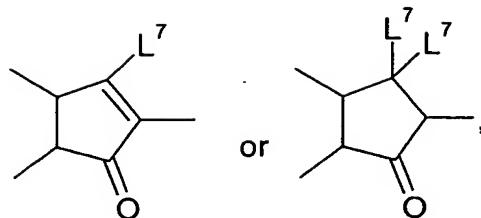
b



c

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- 85 -



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d

e

Z is in each case, independently of one another, a single bond, a double bond, -CF₂O-, -OCF₂-, -CH₂CH₂-, -CF₂CF₂-, -C(O)O-, -OC(O)-, -CH₂O-, -OCH₂-, -CF=CH-, -CH=CF-, -CF=CF-, -CH=CH- or -C≡C-,

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A is in each case, independently of one another, 1,4-phenylene, in which =CH- may be replaced once or twice by =N-, and which may be monosubstituted to tetrasubstituted, independently of one another, by halogen (-F, -Cl, -Br, -I), -CN, -CH₃, -CH₂F, -CHF₂, -CF₃, -OCH₃, -OCH₂F, -OCHF₂ or -OCF₃, 1,4-cyclohexylene, 1,4-cyclohexenylene or 1,4-cyclohexadienylene, in which -CH₂- may be replaced once or twice, independently of one another, by -O- or -S- in such a way that heteroatoms are not directly adjacent, and which may be monosubstituted or polysubstituted by halogen, or is 1,3-cyclobutylene or bicyclo[2.2.2]octane,

R is hydrogen, an alkyl, alkoxy, alkenyl or alkynyl radical having from 1 to 15 or 2 to 15 carbon atoms respectively which is unsubstituted, monosubstituted by -CF₃ or at least monosubstituted by halogen, where, in addition, one or more CH₂ groups in these radicals may each, independently of one another, be replaced by -O-, -S-, -CO-, -COO-, -OCO- or -OCO-O- in such a way that heteroatoms are not directly adjacent, halogen, -CN, -SCN, -NCS, -SF₅, -CF₃, -OCF₃, -OCHF₂ or -OCH₂F,

n is 0, 1, 2 or 3, and

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L¹ - L⁸ are each, independently of one another, hydrogen, an alkyl, alkoxy, alkenyl or alkynyl radical having from 1 to 15 or 2 to 15

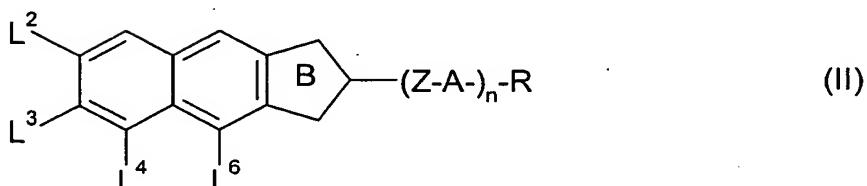
- 86 -

carbon atoms respectively which is unsubstituted or at least mono-substituted by halogen, where, in addition, one or more CH₂ groups in these radicals may each, independently of one another, be replaced by -O-, -S-, -CO-, -COO-, -OCO- or -OCO-O- in such a way that heteroatoms are not directly adjacent, halogen, -CN, -SCN, -NCS, -SF₅, -CF₃, -OCF₃, -OCHF₂, -OCH₂F or -(Z-A-)_n-R.

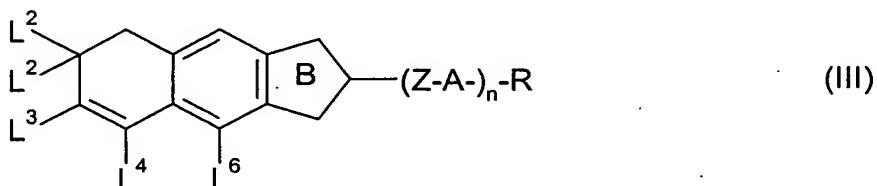
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2. Cyclopenta[b]naphthalene derivatives according to Claim 1
selected from the general formulae (II) to (VI)

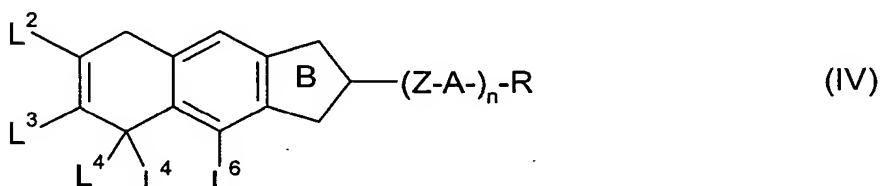
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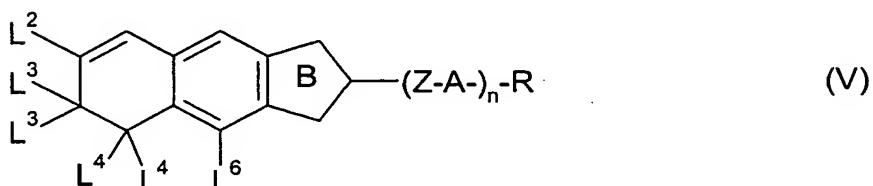
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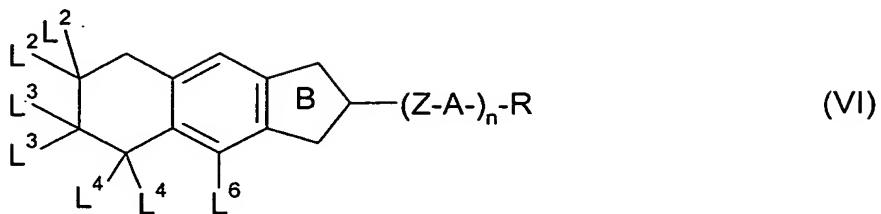
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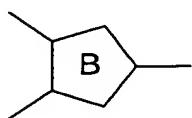
- 87 -



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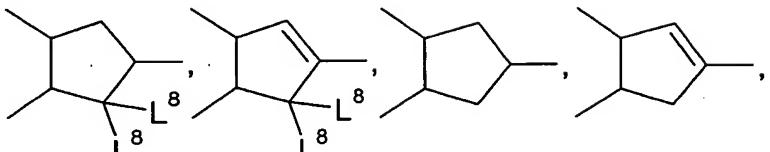
in which:

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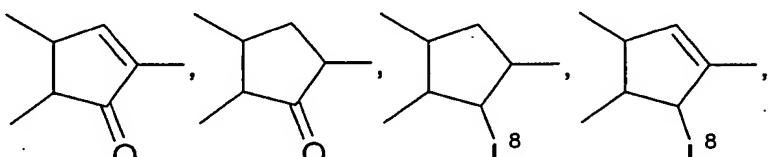


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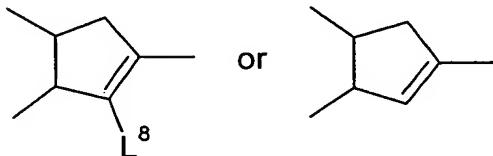
is



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Z is in each case, independently of one another, a single bond, a double bond, $-CF_2O-$, $-OCF_2-$, $-CH_2CH_2-$, $-CF_2CF_2-$, $-C(O)O-$, $-OC(O)-$, $-CH_2O-$, $-OCH_2-$, $-CF=CH-$, $-CH=CF-$, $-CF=CF-$, $-CH=CH-$ or $-C\equiv C-$,

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A is in each case, independently of one another, 1,4-phenylene, in which =CH- may be replaced once or twice by =N-, and which may be monosubstituted to tetrasubstituted, independently of one another, by halogen (-F, -Cl, -Br, -I), -CN, -CH₃, -CH₂F, -CHF₂, -CF₃, -OCH₃, -OCH₂F, -OCHF₂ or -OCF₃, 1,4-cyclohexylene, 1,4-cyclohexenylene or 1,4-cyclohexadienylene, in which -CH₂- may be replaced once or twice, independently of one another, by -O- or -S- in such a way that heteroatoms are not directly adjacent, and which may be monosubstituted or polysubstituted by halogen, or is 1,3-cyclobutylene or bicyclo[2.2.2]octane,

R is hydrogen, an alkyl, alkoxy, alkenyl or alkynyl radical having from 1 to 15 or 2 to 15 carbon atoms respectively which is unsubstituted, monosubstituted by -CF₃ or at least monosubstituted by halogen, where, in addition, one or more CH₂ groups in these radicals may each, independently of one another, be replaced by -O-, -S-, -CO-, -COO-, -OCO- or -OCO-O- in such a way that heteroatoms are not directly adjacent, halogen, -CN, -SCN, -NCS, -SF₅, -CF₃, -OCF₃, -OCHF₂ or -OCH₂F,

L², L³ and L⁸ are each, independently of one another, hydrogen, an alkyl, alkoxy, alkenyl or alkynyl radical having from 1 to 15 or 2 to 15 carbon atoms respectively which is unsubstituted or at least monosubstituted by halogen, where, in addition, one or more CH₂ groups in these radicals may each, independently of one another, be replaced by -O-, -S-, -CO-, -COO-, -OCO- or -OCO-O- in such a way that heteroatoms are not directly adjacent, halogen, -CN, -SCN, -NCS, -SF₅, -CF₃, -OCF₃, -OCHF₂, -OCH₂F or -(Z-A-)_n-R,

L⁴ and L⁶ are each, independently of one another, hydrogen, an alkyl, alkoxy, alkenyl or alkynyl radical having from 1 to 15 or 2 to 15 carbon atoms respectively which is at least monosubstituted by halogen, where, in addition, one or more CH₂ groups in these radicals may each, independently of one another, be replaced by -O-, -S-, -CO-, -COO-, -OCO- or -OCO-O- in such a way that heteroatoms are not directly adjacent, halogen, -CN, -SF₅, -SCN, -NCS,

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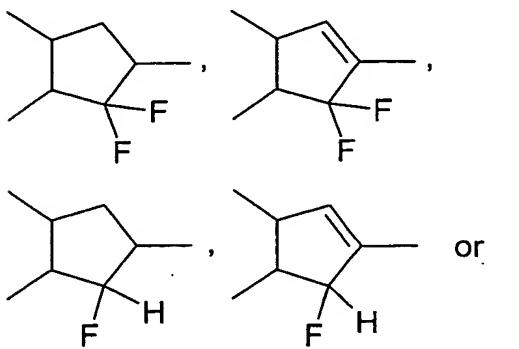
$-\text{CF}_3$, $-\text{OCF}_3$, $-\text{OCHF}_2$ or $-\text{OCH}_2\text{F}$, preferably with the proviso that L^4 and L^6 cannot simultaneously be hydrogen, and

n is 0, 1, 2 or 3.

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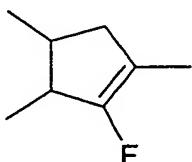
3. Cyclopenta[b]naphthalene derivatives according to Claim 2, characterised in that B is

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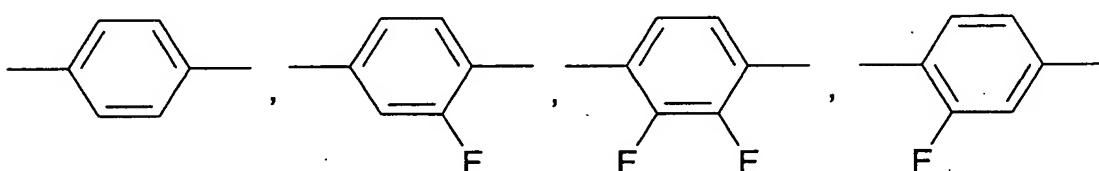
or



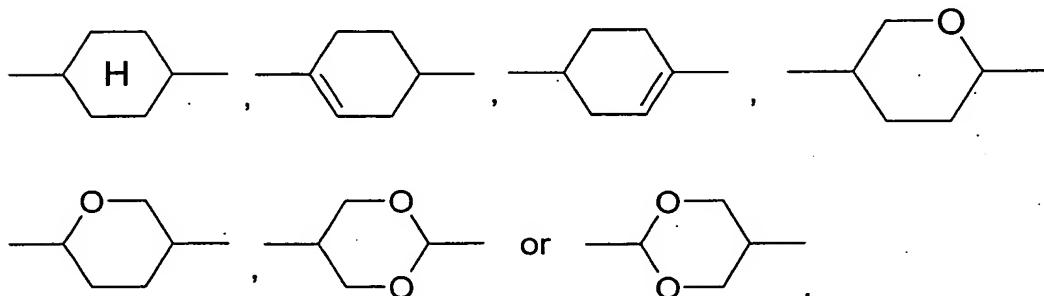
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4. Cyclopenta[b]naphthalene derivatives according to Claim 2 or 3, characterised in that A is

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5. Cyclopenta[b]naphthalene derivatives according to at least one of Claims 2 to 4, characterised in that L² and L³, independently of one another, are hydrogen, an alkoxy radical having from 1 to 7 carbon atoms, fluorine or chlorine.

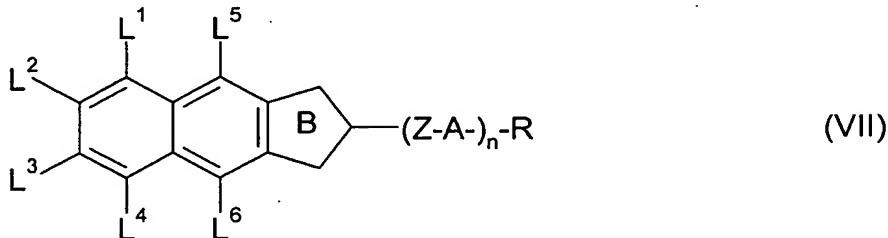
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6. Cyclopenta[b]naphthalene derivatives according to at least one of Claims 2 to 5, characterised in that L⁴ and L⁶, independently of one another, are -CF₃, fluorine or chlorine.

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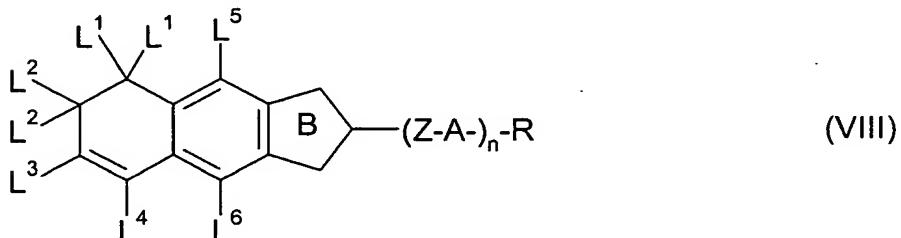
7. Cyclopenta[b]naphthalene derivatives according to Claim 1, selected from the general formulae (VII) to (XI)

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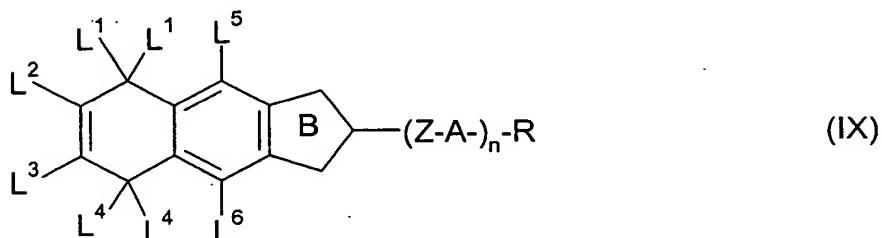
(VII)

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(VIII)

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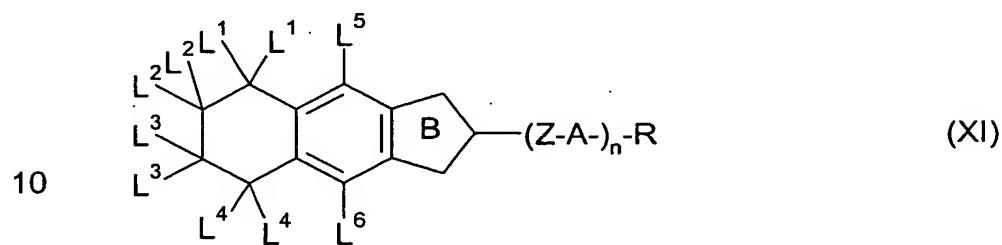
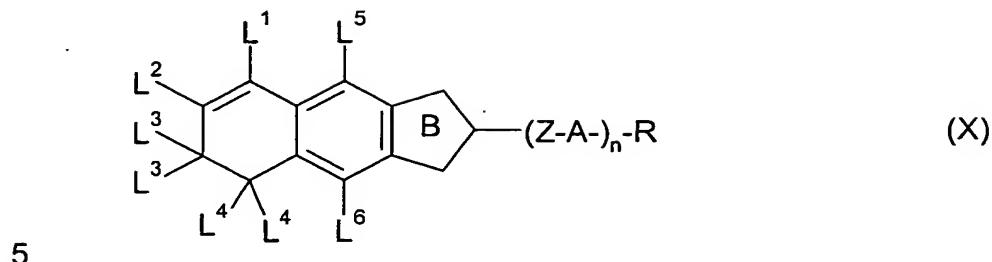


(IX)

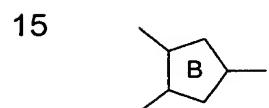
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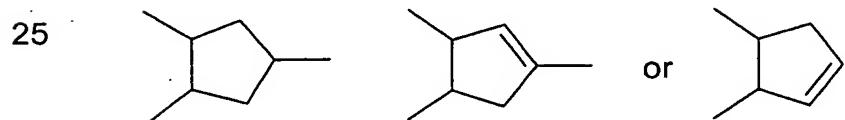
in which Z, A, R, n, L¹ to L⁸ and



are as defined in Claim 1.

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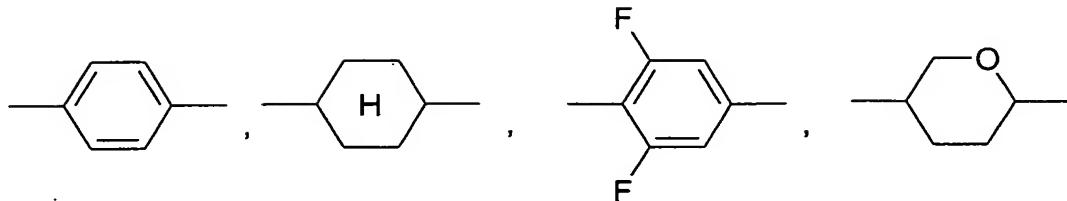
8. Cyclopenta[b]naphthalene derivatives according to Claim 7,
characterised in that B is



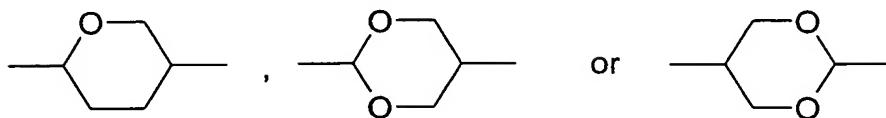
30 9. Cyclopenta[b]naphthalene derivatives according to Claim 7 or
8, characterised in that A is

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10. Cyclopenta[b]naphthalene derivatives according to at least one of Claims 7 to 9, characterised in that L² and L³, independently of one another, are identical or different and are hydrogen, halogen, -CN, -SCN, -NCS, -SF₅, -CF₃, -CHF₂, -OCF₃ or -OCHF₂.

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11. Cyclopenta[b]naphthalene derivatives according to at least one of Claims 7 to 10, characterised in that L¹ and L⁴, independently of one another, are identical or different and are hydrogen or fluorine.

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12. Cyclopenta[b]naphthalene derivatives according to at least one of Claims 7 to 11, characterised in that L⁵ and L⁶ are hydrogen.

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13. Cyclopenta[b]naphthalene derivatives according to at least one of Claims 7 and 12, characterised in that L¹, L², L³ and L⁴ are fluorine and L⁵ and L⁶ are hydrogen.

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14. Cyclopenta[b]naphthalene derivatives according to at least one of the preceding claims, characterised in that Z is a single bond, -CF₂O-, -OCF₂-, -CF₂CF₂-, -CH=CH-, -CF=CH-, -CH=CF- or -CF=CF-.

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15. Cyclopenta[b]naphthalene derivatives according to at least one of the preceding claims, characterised in that R is an alkyl radical, alkoxy radical or alkenyl radical having from 1 to 7 or 2 to 7 carbon atoms respectively.

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16. Use of cyclopenta[b]naphthalene derivatives according to at least one of the preceding claims in liquid-crystalline media.

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17. Liquid-crystalline medium comprising at least two liquid-crystalline compounds, characterised in that it comprises at least one cyclopenta[b]naphthalene derivative according to at least one of Claims 1 to 15.

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18. Electro-optical display element containing a liquid-crystalline medium according to Claim 17.

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19. Mesogenic medium, characterised in that it comprises at least one cyclopenta[b]naphthalene derivative according to at least one of Claims 7 to 15.

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20. Electro-optical light-control element which contains an electrode arrangement, at least one element for polarisation of the light and a mesogenic control medium, where the light-control element is operated at a temperature at which the mesogenic control medium in the unaddressed state is in the isotropic phase, characterised in that the mesogenic control medium comprises at least one cyclopenta[b]naphthalene derivative according to at least one of Claims 7 to 15.

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